

REMARKS

The Applicants thank the Examiner for the careful examination of this application and respectfully request the entry of the amendments indicated hereinabove. This Amendment is submitted in order to prepare this case for appeal.

Claims 1-18 are pending. Of the pending claim set, Claims 1-10 are rejected and Claims 11-18 are withdrawn from consideration. Claims 1 and 10 are amended hereinabove.

Amended independent Claim 1 positively recites forming an interfacial layer of nitrogen, forming at least one sidewall layer, and forming a capping layer of contiguous silicon nitride. In addition, Claim 1 positively recites forming a layer of insulating material in contact with a total exposed surface of the lightly-doped extension regions. These four advantageously claimed features are not taught or suggested by the patents granted to Guo, Moore, Takenouchi et al., or Tseng et al.; either alone or in combination.

Guo does not teach the advantageously claimed invention because Guo does not teach forming a layer of insulating material, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride (column 3 lines 13-22 and 49-55; FIG. 4). Similarly, Moore does not teach the

advantageously claimed invention because Moore does not teach forming a layer of insulating material, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride (paragraphs 0020, 0023, 0031; FIGS. 3-4). Furthermore, Tseng et al. does not teach the advantageously claimed invention because Tseng et al. does not teach forming a layer of insulating material, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride (column 4 lines 1-44, FIG. 9). Moreover, Takenouchi et al. does not teach the advantageously claimed invention because Takenouchi et al. does not teach forming a layer of insulating material, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride (column 4 lines 1-29; FIGS. 2B-2C). Therefore, the combination of Guo, Moore, Takenouchi et al., and Tseng et al. also does not teach forming the four advantageously claimed features; namely, a layer of insulating material, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride.

In addition, Guo does not teach the advantageously claimed invention because Guo does not teach forming a layer of insulating material in contact with a total exposed surface of the lightly-doped extension regions (column 3 lines 24-27; FIGS. 2 and 4). Similarly, Moore does not teach the advantageously claimed invention because Moore does not teach forming a layer of insulating material in contact with a total exposed surface of the lightly-doped extension regions (paragraph 0031; FIG. 4). Furthermore, Tseng et al. does not teach the

advantageously claimed invention because Tseng et al. does not teach forming a layer of insulating material in contact with a total exposed surface of the lightly-doped extension regions (column 4 lines 1-37). Moreover, Takenouchi et al. does not teach the advantageously claimed invention because Takenouchi et al. does not teach forming a layer of insulating material in contact with a total exposed surface of the lightly-doped extension regions (column 4 lines 1-20; FIG. 2B). Therefore, the combination of Guo, Moore, Takenouchi et al., and Tseng et al. also does not teach forming a layer of insulating material in contact with a total exposed surface of the lightly-doped extension regions, as advantageously claimed.

Regarding Claim 1, the Applicants traverse the assertion (on page 3 of the Office Action) that element 16 of Guo is the advantageously claimed layer of insulating material. The Applicants submit that element 16 corresponds to the claimed ‘sidewall layer’ (column 3 line 25) but not the claimed layer of insulating material. Similarly, the Applicants traverse the assertion (on page 4 of the Office Action) that either element 16 or 36 of Takenouchi et al. is the advantageously claimed layer of insulating material (the Applicants note that the Office Action does not specify which element of FIGS. 2A-2D is considered the “insulation layer” by the Examiner). The Applicants submit that element 16 corresponds to the claimed ‘dielectric gate structure’ (column 3 lines 18-22, column 4 lines 24-29) but not the claimed layer of insulating material. In addition, the Applicants submit that element 36 corresponds to the claimed ‘sidewall layer’ (column 4 lines 21-24) but not the

claimed layer of insulating material (plus element 36 is not ‘in contact with a total exposed surface of the lightly-doped extension regions’, as advantageously claimed).

Regarding Claim 5, the Applicants traverse the assertion (on page 5 of the Office Action) that Claim 2 of Guo teaches the advantageously claimed insulating layer of Claim 5. The Applicants submit that Claim 2 of Guo is directed to the gate dielectric (column 5 line 1); however, the gate dielectric cannot be the advantageously claimed insulating layer of Claim 5 because the advantageously claimed insulating layer is formed over the LDD regions (see Applicants’ Claim 1) but the gate dielectric layer of Guo (element 12 of FIGS. 2 and 4) is not formed over the LDD (as positively recited in the Applicants’ Claim 1).

Regarding Claim 6, the Applicants respectfully traverse the assertion (on page 5 of the Office Action) that Claim 4 of Guo teaches the advantageously claimed methods of thermal annealing, plasma treatment, or N implantation. The Applicants submit that Claim 4 of Guo lists the composition of gases for the nitridizing step but does not specify the claimed method of incorporating nitrogen (such as the N₂ plasma treatment).

Regarding Claim 8, the Applicants respectfully traverse the assertion (on page 6 of the Office Action) that Claim 22 of Guo teaches the advantageously

claimed time range of less than 10 seconds. The Applicants submit that Claim 22 of Guo does not specify the advantageously claimed time range. In addition, the Applicants respectfully traverse the assertion (on page 6 of the Office Action) that Claim 22 of Guo teaches the advantageously claimed temperature range of 1000-1100 degrees centigrade. The Applicants submit that Claim 22 of Guo specifies the temperature range of 800-1000 degrees centigrade, but Guo does not specify the advantageously claimed temperature range.

Due to the foregoing reasons, the Applicants respectfully traverse the Examiner's rejection of Claim 1 and respectfully assert that Claim 1 is patentable over the patents granted to Guo, Moore, and Tseng et al.; either alone or in combination. Furthermore, Claims 2-9 are allowable for depending on allowable independent Claim 1 and, in combination, including limitations not taught or described in the references of record.

Amended independent Claim 10 positively recites forming an interfacial layer of nitrogen, forming at least one sidewall layer, and forming a capping layer of contiguous silicon nitride. In addition, Claim 10 positively recites forming a layer of silicon oxide in contact with a total exposed surface of the lightly-doped extension regions. These four advantageously claimed features are not taught or suggested by the patents granted to Guo, Takenouchi et al., or Tseng et al.; either alone or in combination.

Guo does not teach the advantageously claimed invention because Guo does not teach forming a layer of silicon oxide, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride (column 3 lines 13-22 and 49-55; FIG. 4). Similarly, Tseng et al. does not teach the advantageously claimed invention because Tseng et al. does not teach forming a layer of silicon oxide, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride (column 4 lines 1-44, FIG. 9). Moreover, Takenouchi et al. does not teach the advantageously claimed invention because Takenouchi et al. does not teach forming a layer of silicon oxide, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride (column 4 lines 1-29; FIGS. 2B-2C). Therefore, the combination of Guo, Takenouchi et al., and Tseng et al. also does not teach forming the four advantageously claimed features; namely, a layer of silicon oxide, an interfacial layer of nitrogen, at least one sidewall layer, and a capping layer of contiguous silicon nitride.

In addition, Guo does not teach the advantageously claimed invention because Guo does not teach forming a layer of silicon oxide in contact with a total exposed surface of the lightly-doped extension regions (column 3 lines 24-27; FIGS. 2 and 4). Similarly, Tseng et al. does not teach the advantageously claimed invention because Tseng et al. does not teach forming a layer of silicon oxide in

contact with a total exposed surface of the lightly-doped extension regions (column 4 lines 1-37). Moreover, Takenouchi et al. does not teach the advantageously claimed invention because Takenouchi et al. does not teach forming a layer of silicon oxide in contact with a total exposed surface of the lightly-doped extension regions (column 4 lines 1-20; FIG. 2B). Therefore, the combination of Guo, Takenouchi et al., and Tseng et al. also does not teach forming a layer of silicon oxide in contact with a total exposed surface of the lightly-doped extension regions, as advantageously claimed.

The Applicants traverse the assertion (on page 7 of the Office Action) that element 16 of Guo is the advantageously claimed layer of silicon oxide. The Applicants submit that element 16 corresponds to the claimed ‘sidewall layer’ (column 3 line 25) but not the claimed layer of silicon oxide. (The Applicants note that page 7 of the Office Action contains a non-specific assertion that FIG. 4 of Guo shows the claimed layer of silicon oxide. The Office Action does not specify which of the several elements in FIG. 4 is asserted to be the claimed layer of silicon oxide; therefore, element 16 was assumed because of the corresponding comments on page 3 of the Office Action.) Furthermore, the asserted “layer of silicon oxide” of Guo is not “over the total exposed surface of the lightly-doped extension regions” as advantageously claimed.

In addition, the Applicants respectfully traverse the assertion (on page 8 of the Office Action) that Claim 22 of Guo teaches the advantageously claimed time range of less than 10 seconds. The Applicants submit that Claim 22 of Guo does not specify the advantageously claimed time range. In addition, the Applicants respectfully traverse the assertion (on page 8 of the Office Action) that Claim 22 of Guo teaches the advantageously claimed temperature range of 1000-1100 degrees centigrade. The Applicants submit that Claim 22 of Guo specifies the temperature range of 800-1000 degrees centigrade, but Guo does not specify the advantageously claimed temperature range.

Moreover, the Applicants respectfully traverse the assertion (on page 8 of the Office Action) that the ‘silicon oxide layer’ of Guo should be combined with the ‘multilayered gate dielectrics’ of Tseng. The Applicants submit that “a gate dielectric structure” and “a layer of silicon oxide” are distinctly claimed elements; therefore, combining “the teachings of Guo and Tseng to enable the gate dielectric formation step of Guo to be performed according to the teachings of Tseng” in order to “look to alternative suitable methods of performing the disclosed gate dielectric formation step of Guo” would result in a single element but not distinct elements, as advantageously claimed.

Due to the foregoing reasons, the Applicants respectfully traverse the Examiner’s rejection of Claim 10 and respectfully assert that Claim 10 is patentable

over the patents granted to Guo, Takenouchi et al., and Tseng et al.; either alone or in combination.

For the reasons stated above, this application is believed to be in condition for allowance. Reexamination and reconsideration is requested.

Respectfully submitted,

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